

NEW SPECIES AND HISTORIES IN PAPAPEMA SM.
(LEPID.)

BY HENRY BIRD, RYE, N.Y.

(Continued from Vol. XLV, p. 126.)

More than ten years ago the writer encountered a *Papaipema* larva at Rye boring Loosestrife, *Lysimachia quadrifolia*, and in the interim a wide occurrence of its work has been noted. At that time the imago was successfully reared, and there was surprise that it appeared to be but a small form of the well-known *P. purpurifascia* G&R, which was known to have an indigenous food-plant in Columbine, *Aquilegia canadensis*. In 1902 (Can. Ent., vol. XXXIV, p. 118) attention was called to a difference between these larvæ, but the moths seemed so nearly identical except in size, it was believed the small diameter of the Loosestrife stems might account for the reduced size of the resultant moth.

As the years go by and more extended observations on the habits of the genus accrue, it is noticed how the Columbine feeders begin to emerge weeks in advance of the other, being one of the earliest of the local species in that respect. True, it continues to emerge for over a month and overlaps the Loosestrife feeder but there seems always two weeks difference with the earliest ones of the respective forms. The *Papaipemæ*, as with most mid-season moths, are quite prompt on the dates of their first appearance, and as these two larvæ often flourish within a few feet of each other, such discrepancy was a point to be considered. It is found the latter is much the commoner and more generally diffused, due doubtless to a more widespread foodplant. Finally, a familiarity with a large series of moths, resultant of personal field work from southern Canada to Delaware, makes clear the points of difference that are constant with the imago, and careful comparisons of the larvæ through their various stages, establishes the fact that we have clearly to do with two well-defined species. Of some weight in a general summing up, the Loosestrife feeder is found to be kept down by a parasite all its own, while *purpurifascia* falls to the general ones, mainly the *Hemiteles* and a *Ceromasia* fly, that are common checks throughout the genus.

Before considering more specifically this smaller, narrower winged species, which is clearly the more primitive of the two, it

is important to refer to the synonymy, since they have been always confused.

In 1862 Harris described the Columbine feeder as *Gortyna leucostigma*, (Ins. Inj. Veg., p. 440), but this name was preoccupied. Grote and Robinson advanced the name *purpurifascia* in 1868 (Trans. Amer. Soc., vol. I, p. 341), describing from two specimens, and they clearly had both forms before them. They first, and at much length, described the Columbine form, a female, and their figure (plate 7, fig. 51), confirms what they clearly intended as representing their species. They described their other specimen, a male, last and in a few words, noting, however, the differences of ornamentation that are distinguishing features between the two forms. While it seems very clear, lest future questions arise, the name *purpurifascia* G&R, is herewith restricted to the above-mentioned female type of their description. This will accord agreeably to later interpretations and uses of the name, in the more important references where figures have been given. Slingerland, Can. Ent., vol. XXIX, 161; Holland, Moth Book, pl. XXVI, fig. 7; Hampson, Cat. Lep. Phal. Br. Mus., pl. CXXXVIII, fig. 25, all figure the Columbine borer as *purpurifascia*.

For the Loosestribe borer the following specific name is proposed:

***Papaipema lysimachiae*, n. sp.**

Size small, form and pattern typical, sexes similar. Head reddish purple, white scales at base of ciliate antenna; thoracic tufts and patagiæ edged in deeper purple. Abdomen of the luteous yellow of the secondaries, the tufts minute. Primaries rich yellow powdered with red brown, the basal, subterminal and median shade lines defined with the latter colour, and of usual delineation, the post median line double, the inner very finely drawn with red brown, the outer rather fasciate, dark purple or blackish, its course inwardly oblique and quite rigid after a sharp turn below the costa; subterminal line lunulate, fine, outwardly dentate on veins, emphasized as defining the glistening purplish subterminal space from the redder terminal area; a marginal line at base of purplish cilia. Basal spots, median field and apex of the bright yellow ground colour, the inner basal area and subterminal space reddish purple, the latter darkest and rather iridescent, but contrasts are not strong. The orbicular and double claviform show as three super-

imposed, pure white spots, united, except where cut by median vein, and linear, longer than with near ally. Reniform is of ground colour, inwardly marked at top and bottom by a white dot, never wholly white. Secondaries pale, luteous yellow with rows or purplish reflection that deepens in a marginal band. Beneath powdery, shaded with purplish. Size is very constant with no disparity in the sexes. Expanse, 27.5 to 31 mm. The male genitalia conform to the usual type pattern of the yellow species, the irregular, spinulated cucullus, the long curved harpe, dorsally edged in part with fine teeth, indicate the common generic features here. Habitat: Southern Canada and eastern United States generally through range of foodplant. Montreal and north shore of Lake Erie, Can.; Webster, N.H.; Buffalo, Albany, Staten Island, Rye, West Chester Co., N.Y.; Fairfield Co., Conn.; Newfoundland, N.J.; New Brighton, Pa.; Wilmington, Del. Type locality: To meet the desired exactitude, the locality of the particular male type example thus labelled is Polly Park Wood, N. 42 deg. W. 530 meters intersection of Purchase St. and Polly Park Road, Town of Harrison, West Chester Co., N.Y., U.S.A.

Twenty specimens showing equally the sexes are at hand. Paratypes will be placed in the U. S. National and British Museums; the male type with the author.

The larval period extends from the first week of June to Aug. 15, the larva hatching from the hibernated egg. As an instance of disparity, early *purpurifascia* moths begin to emerge by this last date. By the second larval stage the continuous dorsal stripe is conspicuous, that alone being unbroken. The colour is a warm shade of brown seemingly deeper on the middle by reason of the absence of side lines. In these early features it is similar to a dozen other species.

Stage IV.—Characteristics normal; head golden yellow, side marking not always present; body cylindrical, colour sienna brown, lines cream white, dorsal alone entire, a wide well-defined stripe; tubercles brown, IV the largest, about three times the size of spiracle, on joint ten III and IIIa tend to coalesce, IV large and low down, IVa above the line of spiracle and smaller.

Stage V.—Similar, the proportions cylindrical and attenuated.

Penultimate stage.—Little change, the ground colour lighter

and more of a pinkish hue, the cream-coloured lines hold their prominence, the subspiracular strong on thoracic joints; tubercles the same.

Maturity.—An exceedingly cylindrical larva of small diameter; the colour fades to a yellowish translucence, the demarkation of the lines is lost. Thoracic and anal plate of usual proportions, the former edged with black; tubercles have deteriorated in size, except on joint eleven I and II are the merest dots, IV holds its prominence, on ten IVa is sometimes wanting, but III and IIIa usually coalesce, on eleven their union is more clear. Setæ are weak and unnoticed without a lens. Larval length for the above stages: 24, 28, 31, 39 mm., respectively. General dates for pupation are August 12 to 18; for emergence, September 5 to 20.

The pupa is small and slender, light brown and shining, the white spots easily seen when about ready to disclose the moth; the cremaster is two fine spines curved at the point. Length 15 to 18 mm.

Lysimachiæ larvæ differ from *purpurifascia* in the character of the dorsal line, the size and colour of the body, while the tubercles of the latter are larger and black. The dorsal stripe is a larval character in the genus offering ready aid in differentiating certain sections. This line may be broken abruptly on the first four abdominal segments; it may cross this as a mere thread, or it may be a broad even stripe in its entirety. The Loosestrife borer is of the latter class, while *purpurifascia* has a narrow, thread-like line, indistinct and reduced on the joints in question especially in the earlier stages. They differ more autopically than the larvæ of such dissimilar species in the moth state, as *necopina* and *harrisii*. Throughout the month of June particularly the browned foliage of the Loosestrife here and there point out the presence of this larva where a stem has been bored, and died. It is always the upland, whorled, or four-leaved species, *quadrifolia*, that is selected by this larva, *L. terrestris*, a frequenter of wet places not being infested, though its stem would be more commodious. The latter is often bored by a stragglng *cataphracta* or *marginidens*, but my experience is negative as concerns *lysimachiæ*. The former is very persistent, its running rootstocks often matting an area to the exclusion of other plants. The even whorled foliage massed in clumps quickly catches the eye, and forms a background on which

the leathery brown leaves of the bored stem stand out strongly. So one may note the presence of this borer in new territory, even from trolley car or railway train. The principal and only parasite found so far subsisting on this species has not yet been obtained in the imago. There are two or more broods of them surely, since as early as stage four many of the borers have succumbed and the parasites hatched by June 30. The parasitic larvæ that mature by August 10 hibernate after spinning up in a tough cocoon. It is an hymenopterous species, with a larva in miniature like that of *Sphecius*, having pointed, extensile, anterior segments, and attacks the host externally. They attain a length of four millimeters, subsist on the juices of the dead host, and mature rapidly, a necessity under the circumstances. From two to ten may infest one host, and they spin their flattened, tapering cocoons together in a mass in a nearby portion of the larval tunnel. At a late date in the fall they are yet unchanged to a pupal form. In our rather extended breedings of this group heretofore this parasite has not been encountered with any other species.

BOOK NOTICE.

THE BOMBIDÆ OF THE NEW WORLD.—Transactions of the American Entomological Society, XXXVIII, pp. 177-486, issued Feb. 4, 1913; XXXIX, pp. 73-200, issued July 17, 1913; 22 plates. By H. J. Franklin, Ph. D.

That this extensive monograph of the genera *Bombus* and *Psithyrus* has taken its turn as one of the regular series of papers published by the American Entomological Society, and has therefore appeared without any flourish of trumpets, will not obscure the fact that it is not only a work of great merit, recording the author's painstaking investigations into structural and other characters whereby the species of this somewhat difficult group are well separated with the aid of the material at his disposal—about 5000 North American and about 1000 South American specimens comprising many public and private collections, but also a work that is of especial value to Canadians because of the important position that bumble-bees occupy in the insect fauna of Canada. Of the 47 species of *Bombus* recorded from the region north of Mexico 37 have been found north of the United States